

gascar M. Grandidier discovered the fossil remains of a hippopotamus (a pachyderm not now living in the island), of gigantic tortoises (which are now only found in the little island of Aldebra to the north of Madagascar), and of the probably very recently extinct struthious bird, the *Aepyornis maximus*, whose egg ($12\frac{1}{2}$ in. \times $9\frac{1}{4}$ in.) so far exceeds that of any other known bird. It seems highly probable, therefore, that a systematic examination of these less elevated portions of Madagascar would reveal the existence of much that is interesting both in palæontology and geology, and so light would be thrown upon many problems connected with the anomalous animal life of the country and of the neighbouring islands in the Indian Ocean. It is evident that these maritime plains were under water during portions at least of the Secondary period, at which epoch the high granitic region alone formed the Island of Madagascar, then a country probably only a third of its present extent.

Dr. Auguste Vinson speaks of seeing yellow sandstone on the eastern coast, and he also describes the plain between the two eastern lines of forest as being composed of beds of sedimentary formations, "rich in fossil remains." Unfortunately he gives no particulars as to these alleged extinct organisms, so we are still in the dark as to the geological age of these formations. In sailing down the river Betsiboka to the north-west coast, I noticed at one point that for a considerable distance the river bank was formed by layers of yellowish sandstone closely resembling a low wall of masonry. Some of the courses appeared much weathered, while others had a smooth face as if of much harder materials.

From the account given by an intelligent native of some rocks in the western part of Madagascar, and a little to the south of the centre, a conglomerate seems to be found there, for he describes hard rocks of great size as being filled as thickly as possible with rolled pebbles of all dimensions and shapes. He also mentions that near the sea he found a hard black stone which rang like iron, and was full of shells in good preservation and appearance. Unfortunately he too brought no specimens for examination.

A little more information as to the geology of Madagascar is found in papers contributed to scientific periodicals in England and France several years ago. The earliest of these is by the late Dr. Buckland, who, in a "Notice on the Geological Structure of a Part of the Island of Madagascar" (Port Louquez, near the northern extremity), describes a sandstone without fossils, which he compares to the New Red Sandstone, and in which are intercalated trap-rocks similar to those of Antrim in Ireland.

As to the north-west side of Madagascar, in the *Annales des Mines* (1854, 5me série, t. vi. pp. 570-576) there is a paper on the discovery of beds of lignite both in the island of Nosibé and at two points on the north-west coast. In the opinion of the officers who made the exploration the beds of this combustible are more ancient than the Tertiary formation. It is contained in layers of sandstone and clay schists, is fibrous, and shining, and burns readily with a long and white flame, leaving little ash. If beds of this lignite should be discovered in greater thickness it will therefore be valuable both as steam coal and for use in the industrial arts.

In the same French publication of a little later date (5me série, t. viii., 1856) there is an "Essai sur la Géologie de Nosibé," in which the soil of that island is described as consisting of three different groups of strata:—(1) granitic rock, gneiss, mica-schist, slaty-schist, and plastic clay; (2) red and yellow sandstones, traversed by veins of gneiss and quartz; while (3) is essentially volcanic, consisting of basaltic and trap lavas, overlaid in some places by beds of sandy material, tuffs, and volcanic *rappilis*. The essay is accompanied by a complete geological map.

¹ *Trans. Geol. Soc. London*, vol. v. p. 478.

Since the date of this last paper some further attention has been paid to this part of the country in connection with the French Company proposed by M. Lambert,² but hardly anything more has been done towards a scientific examination of other portions of Madagascar except a slight notice of the peninsula inclosing Antongil Bay,² although probably M. Grandidier will have some fresh information in his great work now in progress.

It may be here observed that a reef barrier of coral extends for at least 350 miles along the east coast, varying in its distance from the land from a quarter of a mile to three or four miles; while fringing reefs surround the northern end of the island, extending for 400 miles down its eastern side, and are also found on the south-west coast.

With regard to minerals, Madagascar is tolerably rich in some of the most useful metals. Iron is found in great abundance in Imérina, sometimes almost in a pure state. In some of the hills it is so plentiful that it is difficult to get a bearing with the compass, from the deflection caused by the iron in the ground. Copper, lead, and silver have also been discovered, and from the geological structure of the country it is highly probable that gold would be found in some of the ravines of the granitic highlands; but as it is at present a serious offence against the native laws to search for the precious metals, hardly anything has been done in this direction. Rock-salt is found near the coast, and nitre is also met with. Iron pyrites, from which sulphur is extracted, is also found in abundance; in the northern part of the island antimony seems to be plentiful, and oxide of manganese has been found about fifty miles south of the capital. A substance resembling plumbago exists in great abundance, and is used by the Malagasy to colour and glaze some of their articles of pottery. A considerable variety of ochres and coloured earths are met with, and are used not only for colouring the native houses, but also in dyeing some of the woven cloths made by the people.

In conclusion, it may be remarked that there is a vast extent of country on the coast-plains where the soil is most fertile, but which is only thinly peopled, or has no population at all. Many parts of the island which separate the territory of one tribe from another are well watered and wooded, and seem to invite occupation. Madagascar could well sustain a population from ten to twenty times its present amount, for hardly any portion of it is rainless or desert, except a small section of the extreme south-western coast. Surrounded by the ocean it enjoys an abundant rainfall, so that the droughts which constantly afflict large portions of Southern Africa never occur in Madagascar, while its insular position gives it a more equable climate, freer from extremes of temperature, than is enjoyed in most tropical countries.

JAMES SIBREE, Jun.

NOTES

THE first zoological station established in Scotland was opened the other day at Cowie, near Stonehaven. The work, which is more directly in connection with the natural history class of the Aberdeen University, will be carried on in a small wooden house which was erected in the beginning of last week on flat ground, a few yards to the north of Cowie, and close to the sea-shore. The building was constructed in sections, special provision being made for ventilation. It consists of two apartments, the lesser of which is to be fitted up as a library and office, while the main room will be devoted to reception of the proceeds of the dredging, trawling, and other expeditions. The latter department contains the dredging and trawling apparatus, a number of microscopes, with chemical and other appliances

¹ See *Annales des Mines*, 6me série, t. x. pp. 277-319.

² *Bull. de la Soc. de Géol.*, Sept. et Oct., 1867.

necessary. Two boats are at the disposal of students—a large yawl and a small boat, kindly lent by Major Innes of Raenoir, who has also given the use of his drill-hall as a store. A select party assembled at luncheon, after which Mr. G. J. Romanes, in a brief and happy address, formally declared the station open. The total sum now raised is 350*l.*, but this is not enough, and we regret that the appeal made through our columns and elsewhere, has not been so successful as it should have been. This, we believe, is more due to want of thought than illiberality, and we trust that the work at this the first genuine zoological station in the kingdom, will not be crippled from want of sufficient funds. Mr. Romanes will be happy to receive further subscriptions.

ON Friday, in the House of Commons, Mr. Shaw-Lefevre asked what arrangements had been made as to the management of the Natural History Collection about to be removed to South Kensington? He hoped that advantage would be taken of this opportunity to make some change, so that the management of that collection might be entirely different from the management of the other collections of the museum. In reply, Mr. Walpole said that the recommendations made by the Royal Commission were communicated to the Treasury in February last, and were then transmitted to the trustees of the museum. The trustees had carefully considered those recommendations and had sent in a scheme to the Treasury, and the matter was now in the Treasury's hands. The views of those who took a particular interest in scientific matters and in the advancement of science had been taken into consideration, and he thought he might say the future management of the museum would give complete satisfaction, not only to them, but to the public generally.

DR. J. FR. BRANDT, the veteran Russian naturalist of St. Petersburg, whose works were referred to in last week's Notes, died on the 7th ult., at the age of seventy-seven. Dr. Brandt has been for many years director of the Imperial Museum of Zoology in the Russian capital, and is author of many important memoirs in the *Transactions* of the Imperial Academy of Sciences of St. Petersburg.

THE *Times* announces the death of Prof. Lamont, a Scotchman by birth, and director of the Munich Observatory. Prof. Lamont, who was seventy-four years of age, and had been employed at the Munich Observatory since 1835, may almost be called the father of modern terrestrial magnetism.

THE death is announced of Herr Joseph Haardt von Hartenthurm, one of the most eminent of German cartographers. He died at Vienna on July 28, at the early age of thirty-nine.

THE proceedings of the first Austrian Anthropological meeting began on July 28, the assembly being exceedingly numerous. Prof. von Hochstetter was the president, and spoke on ambulant meetings for the purpose of common work. Herr Deschmann, of Laibach, read a paper on the latest discoveries in the heathen hill tombs of St. Margarethen. Prof. Gurlitt, of Graz, spoke on clay vases, and Prof. Alfons Müllner on the method of beginning practical work in anthropology. A paper was then read on local geographical and personal names in Carniola, by Dr. Arnold von Luschin. On the 29th Count Wurmbrand and Herr Szombathy delivered lectures on skull measuring and investigations relating to the colours of hair, skin, and eyes. Herr Scheyer spoke on ancient sepulchres, and Herr Obermüller on prehistoric times. In the afternoon the meeting visited the lake-dwellings in the Moorgrund.

AT the celebration of the 100th anniversary of the foundation of the "Naturforschende Gesellschaft" at Halle on July 30 last, Prof. Knoblauch welcomed the guests in an able address. Afterwards the secretary of the Society, Dr. Marchand, gave a historical retrospect of the Society's activity, and then followed a

"festival" address by Prof. Kraus and the reading of a letter from Dr. Naegeli, of Munich.

A MODEL of Mr. George Fawcett's gun-carriage slide (referred to in *NATURE*, vol. xx. p. 337) may be seen at the Royal United Service Institution.

THE *Tokio Times* of May 10 reports a meeting of the Biological Society of the Tokio dai Gaku, on Sunday, May 4. Prof. Yatabe made a communication on the flora of the Bonin Islands. He showed how seeds could be transported thither by means of currents, and called attention to the various currents affecting the fauna and flora of the dependency. He then described the general character of the flora, and pointed out the differences between the plants of the islands and Japan proper. He also called attention to the similarities existing between those of the Bonins and Southern China and India. Mr. I. Iijima communicated some facts regarding the habits of a species of pteropus, a large winged bat from the Bonin Islands, a living male specimen of which was exhibited to the Society. After briefly stating its relations to the mammals, and that the individuals of this group were frugivorous, he stated that there were about forty species known, distributed among the islands of the Pacific. The Bonin Island pteropus subsists chiefly on the banana, frequenting the trees during the daytime, and at night flitting in the air in considerable numbers. The features closely resemble those of the fox, and hence the name of flying-fox generally given them. The fur is long and black, with white hairs intermixed. A few hairs taken from the specimen and others from a Sumatra species were shown under the microscope, and their peculiarities explained. The pteropus constantly hangs from the roost head downward; and when about to sleep hangs by one leg, spreads its wings, and then wraps them closely about the breast, hiding its head beneath the membranous folds. The specimen had been fed almost exclusively on sweet potato, though it would eat boiled peas and rice, and orange if it was juicy. If a big piece of sweet potato is given it, the fragment is grasped by one of the hind legs, and not having an opposable thumb, it is held firmly against the breast. Reaching up the head, the bat tears away a large mouthful and then chews it a long time, making a smacking sound in the act, and at each movement of the jaws thrusts out its lanceolate tongue. The fibre of the potato and pulp of the fruit is invariably ejected from the mouth, and just before doing this, one or two vigorous sucks are heard, as if the animal was drawing out the remaining juice. This performance is accompanied by a singular jerk of the head. In the act of chewing, the morsel is changed from one side of the mouth to the other. When its appetite is fully satisfied it begins to scratch its body with its hind leg. The long tongue also comes into service to cleanse the fur. It is a curious sight to see the long nail on the thumb used as a toothpick. The toes are also employed for a similar purpose. Prof. Yatabe remarked that the banana was not indigenous to the Bonins, but had been introduced, and the pteropus had acquired a taste for it.

ARAGO having been born at Estagel, a small country place in the department of the Pyrenées Orientales, the citizens of Perpignan, the head town of this district, have decided to erect a statue to him by public subscription. The inauguration will take place on September 21 next, and will be celebrated by a three days' *fête*. We are informed that an address will be delivered by M. Paul Bert, the physiologist, and influential member of the Chamber of Deputies. It is strange that no astronomer or physicist has been selected for this great occasion.

THE French Parliament voted before the vacation a law obliging landed proprietors to protect their vines against the invasion of the Phylloxera. The *Journal Officiel* publishes a report signed by M. Teissoniere, member of the Council of the Society

of French Agriculturists, and vice-president of the Chamber of Commerce of Paris, showing the efficacy of sulpho-carbonate for destroying that pest. The experiment was made on 464,557 plants, covering a surface of 110 hectares, or 272 acres. A quantity of about 35 tons of sulpho-carbonate was employed with 10,000 cubic metres of water. The total expense was about 4*l.* per acre. This sum will be reduced very shortly in a large proportion by a diminution of the sulpho-carbonate, which actually costs 2*l.* per cwt., and will be sold at 1*l.* when the method has been adopted on a large scale. The plants were unhurt, and the vegetation was found to be luxuriant. Insects injurious to grapes were destroyed at the same time.

ON the occasion of the inauguration of M. Thiers' statue an aeronautical ascent was made at Nancy on August 4. The wind was blowing from the west with a velocity of 16½ kilometres an hour, and no variation in the direction was perceptible from the ground to 800 metres. The altitude of the balloon was taken by officers from Mazleville, with a theodolite, and signals were exchanged with the ground during the ascent. The signals were given by the aeronauts with a flag, and by officers with a reflecting mirror placed in the end of a tube, and mounted as a telescope. The officers directed the rays of the sun on the balloon, and intercepted rays with a key in order to use the Morse alphabet. The distance of Mazleville from the balloon was more than six kilometres, and the signals could be seen at a much greater distance. This shows that in a besieged town a passing balloon could be used for giving orders to, or receiving news from friendly forces. The system of communication has been invented by one of the officers of the garrison. M. W. de Fonvielle was in the car.

IN 1789 the Royal Library of Paris contained 800,000 volumes and objects of every description. In 1859 the number averaged 1,200,000. During the last twenty years the increase has been more sensible, and the actual number is estimated at 2,000,000. The mean annual increase from legal deposits alone is 20,000. Out of these 2,000,000 about 450,000 are devoted to French history, 200,000 to theology, 90,000 to science and philosophy, 60,000 to natural history, and 20,000 to English history. The greater part of French and English historical and medical works are arranged in printed systematic catalogues placed in the hands of the public. In less than ten years the whole of the catalogues will be printed.

THE Trustees of the South African Museum at Cape Town issue a very satisfactory report for 1878. Several important improvements have been made in the building, valuable additions, especially of insects, have been made, and the collection has been inspected by a large number of South African and foreign naturalists.

A BRIGHT meteor was observed in many places in Saxony and the adjacent Voigtland, during the night of July 26-27. An observer at Droeda (a village in the south-west corner of the kingdom) reports: "At 12.45 the nocturnal darkness was suddenly interrupted by an illumination of the whole firmament, which nearly reached daylight in intensity, and which lasted for three seconds. A beautifully bright blue fire-ball was slowly moving in the heavens from south to north. At Plauen the fall of the meteor was observed, and at Greiz even two fire-balls were seen." Corresponding news reaches us from Leipzig, Dresden, Zwickau, Wiedersberg, &c.

MR. MORRIS's report on the Ceylon coffee-leaf disease, to which we have before referred, urges the necessity of uprooting trees which are very seriously affected, and of treating the remainder with a compound of sulphur and lime. Grass, it is urged, should not be left near the trees, and all diseased leaves should be burnt. Before leaving Ceylon for Jamaica, Mr. Morris was to deliver

an address to the Chamber of Commerce on the all-important subject.

THE *Times* Berlin correspondent states that Dr. Schliemann, after having spent a month's holiday at Kissingen, has gone to pass a few days at his home in Mecklenburg, after which he will proceed to London to superintend the publication of his new work on Troy, embodying all his most recent researches, to which Prof. Virchow will contribute the preface.

AN extremely satisfactory report for 1878 is issued by the Manchester Scientific Students' Association. It contains several interesting papers, including a short presidential address by Prof. Williamson, and instructive accounts of the numerous excursions of the Society. A satisfactory report for 1878-9 has also been issued by the Leicester Literary and Philosophical Society, and we are glad to see, from the seventh report of the Leicester Town Museum, that that institute is steadily improving. Mr. Octavius Stone's New Guinea Birds are being arranged in their new cases by Mr. Montague Brown, and will shortly be ready for exhibition.

THE Peking correspondent of the *North China Herald* states that a college will shortly be opened there for the training of young diplomats, and it is understood that it will be under the direction of a former professor in the Tungwen College, aided by competent assistants.

SOME time ago the *Japan Gazette* stated that the Government were engaged in surveying a line of railway from the coal mines at Horouchi, in the island of Yezo, to Koishigari, a town on the chief branch of the River Ishigari. The survey has now been completed, but the original plan has been altered materially. It appears that the country for some distance along the proposed route is low and subject to occasional inundations from the overflowing of the river. One of these recently occurred, and showed the difficulties of the proposed route. It has, therefore, been determined to make a shorter line to the village of Horouchi, on another branch of the Ishigari, which is navigable for flat-bottomed vessels. The specimens taken from these coal-mines to Yedo are said to be very fine, and as the mines are to be worked on the most approved system, they are expected to prove a great national benefit.

SOME valuable kerosene springs are stated to have been discovered in Uzen and Ugo, two Japanese provinces lying to the north of Yedo.

A JAPAN paper states that the new arsenal and dockyard to be founded at Mihara for the Japanese navy will be very complete and magnificent. Dry and wet docks are to be constructed fit for the largest war-ships; and there will be iron sheds, in which ironclads and wooden war-vessels may be built without hindrance from the weather, as well as foundries, engine-shops, rolling mills, stores, &c. The expense of these works, it is expected, will be enormous, especially as there are also to be barracks and fortifications for their protection.

THE additions to the Zoological Society's Gardens during the past week include a Rude Fox (*Canis rudis*) from Demerara, presented by Mr. G. H. Hawtayne, C.M.Z.S.; a Grey Flying Squirrel (*Sciuropterus fimbriatus*) from North India, presented by Mrs. Louisa Edwards; a White-whiskered Swine (*Sus leucomystax*) from China, presented by Mr. Theodore Hance, C.M.Z.S.; a Black-faced Ibis (*Geronticus melanopsis*) from Chili, presented by Mr. C. H. Whaley; three North American Turkeys (*Meleagris gallopavo*) from North America, presented by Mr. R. Wynne Roberts; three Common Kestrels (*Tinnunculus alaudarius*), European, presented by the Rev. J. E. Campbell Colquhoun; two Vociferous Sea Eagles (*Haliaeetus vocifer*) from East Africa, presented by Dr. J. Kirk, C.M.Z.S.;

a Lanner Falcon (*Falco lanarius*), East European, presented by Lord Lilford, F.Z.S.; a Wood Owl (*Syrnium aluco*), European, presented by Capt. F. Lloyd; two Vulturine Guinea Fowls (*Numida vulturina*), four Elliot's Guinea Fowls (*Numida ellioti*), three Mitred Guinea Fowls (*Numida mitrata*) from East Africa, deposited; a Pileated Jay (*Cyanocorax pileata*) from South America, two Black Storks (*Ciconia nigra*), European, purchased; a Red-fronted Lemur (*Lemur rufifrons*) from Madagascar, a Tamandua Ant-eater (*Tamandua tetradactyla*) from South America, a Black Hornbill (*Buceros atratus*) from West Africa, four Specious Pigeons (*Columba speciosa*), a Banded Tinamou (*Crypturus noctivagus*) from South America, received in exchange; an Amherst Pheasant (*Thaumalea amherstiae*), three Fork-tailed Jungle Fowls (*Gallus furcatus*), three Chilean Pintails (*Dafila spinicauda*), seven Brazilian Teal (*Querquedula brasiliensis*), an Australian Wild Duck (*Anas superciliosa*), bred in the Gardens.

ON SPHENOPHYLLUM, ASTEROPHYLLITES, AND CALAMITES¹

I HAVE just received from Herr D. Stur an abstract of a memoir in which he announces that he has obtained a specimen from the Carboniferous rocks in which he finds twigs of Asterophyllites and Sphenophyllum, forming the branches of the stem of a Calamite, and that the strobili of Bruckmannia occur at the ends of such of the branches as support Sphenophylloid leaves. Herr D. Stur appears to regard Sphenophyllum as representing the foliage of the fruiting twigs of the plant, whilst Asterophyllites represents the ordinary vegetative foliage of the same plant.

That this should be true, so far as regards the unity of Asterophyllites and Sphenophyllum is concerned, appears to me to be most probable. As you are aware, I carefully investigated this subject in Part V. of my series of memoirs "On the Organisation of the Fossil Plants of the Coal-Measures." Accepting the conclusions of M. Renault, published in some of his valuable memoirs on the St. Etienne plants, as conclusive so far as Sphenophyllum is concerned, I showed that plants which are undoubtedly examples of Asterophyllites have stems the internal structure of which is identical with that of M. Renault's Sphenophyllums. These facts led me to the inevitable conclusion that the two genera were very closely allied to one another. In my Memoir, Part IX., I described an additional specimen (Fig. 32), which gave further support to my previously expressed opinion, and the further investigations which I then conducted led me unhesitatingly to affirm "that Asterophyllites and Sphenophyllum are genera so closely allied, that their separate existence finds but little justification in nature" (*loc. cit.*, p. 334). In fact, it has long appeared to me that, morphologically, the leaflet of Sphenophyllum was merely the resultant of the coalescence of two or three leaflets of Asterophyllites.

Herr D. Stur's discovery appears to afford an unanswerable confirmation of these views. His further discovery of Volkmannia² connected with his plant, which combines Sphenophyllum with Asterophyllites, further sustains a conclusion which I have arrived at in my memoir, Part V., pp. 55-56, viz., "that Calamostachys (Volkmannia) binneyana has much closer affinities with Asterophyllites than with Calamites" (*loc. cit.*, p. 65).

But Herr Stur further states that the stem from which these Asterophyllitean and Sphenophylloid twigs spring is a Calamites which he names *Calamites sachsi*. Not being acquainted with the plant to which he gives this name, I can form no opinion as to its nature; but I must confess I find it impossible to believe that it can be a Calamite of the common and only type which we find in England. Both my memoirs, Part I. and Part IX.,

contain a series of illustrations of the structure of our English Calamites, from that of stems that must have been nearly half a metre in diameter down to twigs having only a diameter of '000837 of a metre, which latter specimens are, I presume, the most minute examples that have been recorded by any observer. Yet all these graduated Calamites have exactly the same typical structure; they possess an ample medulla, which becomes fistular at an early age; this is surrounded by a circle of longitudinal canals, which run from node to node. External to each canal we find a corresponding wedge-shaped mass of radiating vascular laminae. These wedges are widely separated, in young plants and branches, by large, radial prolongations of the pith—the primary medullary rays of my memoirs—but in older branches these rays diminish in size, so that the wedges become blended together at their broad sub-cortical portions. These Zylem structures are enclosed within a true Phloem, which is uniformly parenchymatous in its young state, but which becomes differentiated into two or more layers, as the plant grows older; the chief of these layers, so far as size is concerned, being a thick mass of prosenchyma. Now the internal structure of Asterophyllites and Sphenophyllum differs from that of Calamites in every one of these features. The youngest twigs, as well as the larger branches of these two genera, are equally devoid of a medulla. The place occupied by that cellular tissue in the young Calamite is filled, in equally young twigs of Asterophyllites and Sphenophyllum by an exclusively vascular bundle, transverse sections of which exhibit the form of a remarkable triangle with three very concave sides. There are no inter-nodal canals, and the vascular zone, which is largely developed externally to the primary triangular vascular bundle by an exogenous process of growth, is not divided into separate wedges by large primary medullary rays. In Calamites each vascular wedge is subdivided into laminae by numerous, perfectly developed, secondary medullary rays. In Asterophyllites and Sphenophyllum, these rays are of the most rudimentary character, though they exist, as my friend M. Renault has shown, in the shape of groups of cells distributed through the vascular zone.¹

The bark of the two genera in question is as distinct from that of Calamites as are the medullary and Zylem portions of the respective stems. It consists of two layers which have no counterparts in the Phloem of Calamites. In addition to these details, there is a general triquetrous arrangement in the organisation of Asterophyllites and Sphenophyllum, which has no existence in Calamites. The foliar vascular bundles of the former are only given off from the apex of each of the three prolonged angles of the central triangular bundle of the young twig, whilst no one of the wedges forming the regular Zylem-cylinder of the Calamite has any predominance over the rest.

Such extreme and fundamental differences as these, affecting, as they do, the structure of every layer of tissue from the centre to the periphery of the axis, and at every stage of its growth, make it absolutely impossible that Asterophyllites and Sphenophyllum can be associated with any of the Calamites that are so abundant in our English coal-measures, and with the organisation of which we are now so perfectly acquainted.

That the stem so long, but so improperly, associated with the genus Calamites, viz., the *Calamites verticillatus* of Lindley and Hutton may have been the arborescent stem of these Sphenophylloid plants is as I have shown in my Memoir, Part V., extremely probable. But, I repeat, this stem has no claim whatever to be included amongst the true Calamites.

Such being the conclusions at which I have arrived from the careful study of the inner structure of an enormous number of stems of Calamites and Asterophyllites, and from a comparison of these latter with the facts published in the valuable Memoirs of M. Renault on Sphenophyllum, I shall look forward with great interest to the results of a critical examination of the stem which our fellow-labourer at Vienna has discovered.

W. C. WILLIAMSON

Further Remarks to the Preceding Treatise, by E. Weiss, Berlin

Stur's remarkable paper, to which the above communication of Prof. Williamson, the esteemed investigator of Manchester, refers, is the description of a slab on which several branches of Asterophyllites give off, at certain points, lateral twigs with the foliage of *Sphenophyllum dichotomum*, some of which bear terminal spikes of Volkmannia, Stur; at other points he finds

¹ So imperfect is the organisation of these medullary rays, that M. Renault is not prepared to recognise their claim to the title, a point on which I am obliged to differ from him.

¹ This brief contribution was originally a letter to Prof. Weiss, of Berlin, but it was kindly translated by him, and published in the *Neuen Jahrbuch für Mineralogie, Geologie und Paläontologie*, Jahrgang, 1872, as a communication, with the title of "Sphenophyllum, Asterophyllites, und Calamites, deren Stellung zu einander nach den letzten Beobachtungen." It is only republished now as being necessary to the understanding of Prof. Weiss's interesting communication, which he published along with mine, and which it appears to me desirable to republish for the benefit of English palaeobotanists. I am indebted to my friend Mr. Hartog for its translation into English.

² Herr Stur's Bruckmannia appear to be that form of spike long designated Volkmannia, but now separated as Calamostachys, and of which the *Calamostachys binneyana* is the only British example with the internal organisation of which we are acquainted.